Section 4

Migration of Landfill Gas

There are numerous driving forces involved in landfill gas migration, including:

1) Pressure gradients radiating from the point of generation,
2) Molecular diffusion,
3) Atmospheric pressure changes, and
4) Soil pressure changes due to groundwater fluctuations.

Typically, pressure gradients and molecular diffusion are the primary driving forces in the migration of landfill gas. Atmospherically-derived drivers for landfill gas migration include the fluctuation of atmospheric pressures caused by the differences in air temperature and density which occurs between day and night, as well as weather-driven barometric pressure changes.

As gas pressure builds in a landfill, the excess pressures can and will force gas to migrate through any weaknesses/flaws which may exist in any of the landfill components and surrounding geologic structures.

Examples of mechanisms that can result in escape of landfill gases from the cell(s) into the environment can include, but are not limited to:

- Punctures or improperly welded seams existing within HDPE liner material,
- Clay-capped landfills which are poorly maintained may have vegetative growth with root structures penetrating the clay cap and creating migration pathways,
- Clay-capped landfills which are poorly maintained may have erosion channels penetrating the clay cap and creating migration pathways,
- Clay-lined/capped landfills which were poorly installed may have dessication cracks penetrating the liner/cap and creating migration pathways,
- Disruption of liner/cap integrity by waste subsidence (poor initial compaction), inadvertent puncture during subsequent drilling activities etc (poor surveying/documentation of closed cell limits), etc.

Once landfill gas has exited the cell limits, there are numerous natural and man-made mechanisms for promoting further gas migration including, but not limited to:

- The presence of naturally occurring high-permeability soils, or dissolution channels (caves) in the vicinity of a cell,
- Underground utilities bedded in materials more of relatively high permeability,
- Other man-made soils disturbances resulting in increased local soils permeabilities.

Figure 2: Potential Effects of Surrounding Geology on Gas Migration - - Porous Soils/Clay Cap

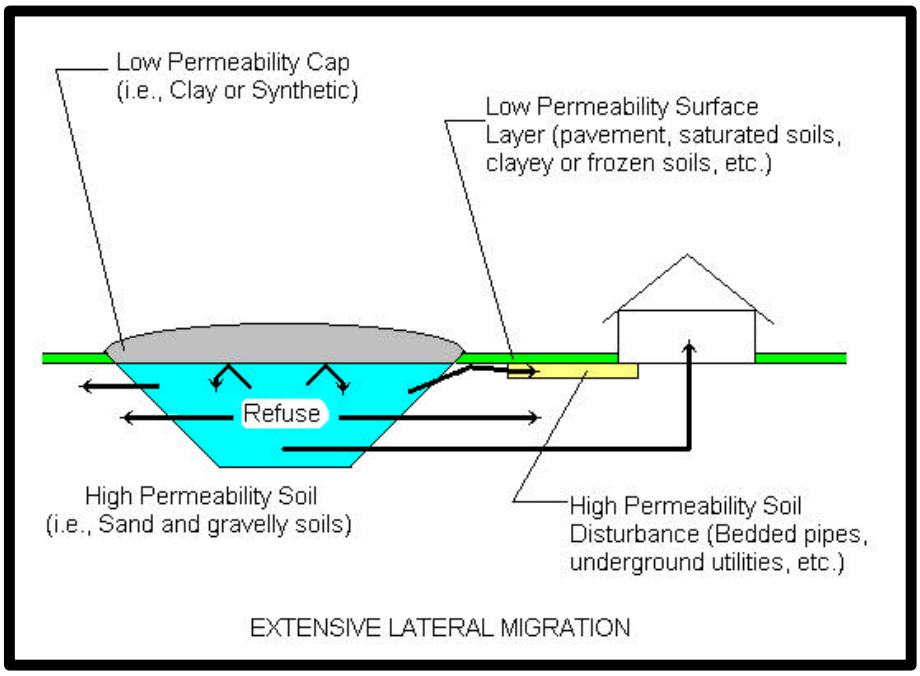

Figure 3: Potential Effects of Surrounding Geology on Gas Migration -- Porous Cover/Impermeable Liner